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A SINGLE-USE SYRINGE INCORPORATING A SLIDING PROTECTION CAP FOR THE NEEDLE. ;

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ABSTRACT:

This invention concerns a single-use syringe (1) having an external longitudinally sliding conforming protection cap (2) for the needle (3a). The sliding cap and the syringe have a mechanism (1a,2a,2b) of reciprocal coupling, whose interference determines the forward and backward end of stroke stop of the cap along the syringe.

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(54) **A single-use syringe incorporating a sliding protection cap for the needle**

Eine Einwegspritze mit einer eingebauten Gleitschutzkappe für die Nadel

Une seringue à usage unique incorporant un capuchon de protection coulissant pour l'aiguille

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## Description

This invention concerns a single-use syringe having a sliding protection cap to prevent users from pricking themselves accidentally with the needle of the syringe.

The object in question was designed to ensure maximum utilization hygiene and safety in the use of plastic "non reusable-throw away" syringes which are the syringes most commonly used in the home, surgeries and hospitals.

In particular, the protection cap of the syringe according to the invention was designed expressly to prevent users from pricking themselves with the needle of a syringe after use, which - as is commonly known - can be an extremely dangerous source of infection and contamination of illnesses, some of which can be mortal.

This feature is especially useful if considered in relation to the current precarious methods of using single-use syringes: currently these syringes are sold inside a sterile and sealed package- with a very thin removable cap which covers the length of the metal needle and press fits, into the collar of the syringe at the base of the needle.

This cap must be removed before giving the injection, but it should also be replaced after the syringe has been used and before it is thrown away.

It should be noted however, that the action required to refit the very small cap on the needle - which should always be done to avoid throwing away the syringe in the garbage with the dangerous needle uncovered - is extremely risky for the person carrying out the operation in that the protection cap is very small.

In fact, often, the person who is carrying out this operation, does not manage - especially if he is distracted - to fit the needle immediately into the hole in the cap: in this case the needle is therefore pushed forward just outside the cap with a good chance of dangerously pricking - often quite deeply - the fingers of the hand holding the cap.

As previously mentioned - the new syringe according to the invention was expressly designed to eliminate any risk of accidental needle pricks to those using single-type syringes.

The idea behind the invention was to fit the syringe with a cap having a wide cross-section and consistent length, which does not fit into the base of the needle collar, but couples and slides with the external walls of the syringe, so that when the cap is completely pushed out with respect to the front end of the syringe, it protects the needle, while when it is pushed completely back, it allows the needle to project externally through a slot at the centre, which the cap has for this purpose, on its front end.

From this brief description it is easy to understand how safe and rational the use of a syringe having the above sliding cap will be.

In fact, while the syringe is still in its sterile package, the cap is held in a fully forward position, so as to cover the needle entirely; when the syringe is to be used, the above cap is pushed backwards - along the external sides of the syringe; when the syringe has been used and is ready to be thrown away, the cap will be pushed forward to cover the needle completely.

It is obvious therefore that the action carried out to cover the needle is carried out in total safety since in this situation the fingers of the user push the sliding cap from the back of the needle and the fingers of the user and the needle never move dangerously against each other, as in the case of current syringes fitted with the small removable caps.

Patent WO A-9000073 describes a syringe characterised by a protection cap, housed externally to the syringe, consisting of a tubular element having the same length as that of the syringe.

Said cap being characterised by several longitudinal grooves at one end, forming a series of elastic tabs with thickened internal edge.

The syringe body having two external annular grooves at the top and at the base, into which the elastic tabs of the cap fit automatically when the same reaches the two extreme positions: fully pulled-back thereby freeing the needle from the cap and fully forward whereby the cap totally covers the needle.

Patent WO A 9000073 In fact provides the teaching on how to attain the first scope of this invention, namely that of eliminating the risk of piercing oneself when replacing the needle cap on the needle after using the syringe before thawing it away.

Patent WO A 9000073 does not however resolve the second problem which is solved by this invention.

Another purpose of the invention is to prevent the risk of needle pricks when the needle is pulled out of the syringe in order to transfer blood from test tubes.

In certain cases, for example in test laboratories, after having taken the blood sample, the needle must be removed from the syringe in order to transfer the blood from the syringe into one or several test tubes.

In this case, the above cap which slides outside the syringe, is of no particular help or prevention against the above type of accident since the removal of the needle requires the complete removal of the cap from the syringe in order to hold the collar of the needle support fitted on the front opening of the syringe, between the thumb and forefinger.

The user therefore finds himself in a dangerous situation during which he has to work with a used syringe with an uncovered needle, where an accidental needle prick could be a dangerous source of infection and contamination of illnesses, some of which can be mortal.

Consequently, a solution that would allow the removal of the needle while it was still inside the sliding cap, was investigated; a solution was found whereby the sliding cap can be removed from the body of the syringe while disconnecting the support needle collar at the

same time, thanks to the special shape of this collar which is connected by suitable a connection mechanism inside the opening of the sliding cap.

In the preferred embodiment of the invention, this sliding cap has an opening with a number of longitudinal slits which separate an annular series of elastic tabs, each of which terminates with an internal raised edge having a semi-circular cross-section which press fits at the end of the forward or backward run of the cap along the syringe, within two annular grooves having a semi-circular cross-section on the external surface of the syringe, one close to the tip and the other close to the opening.

The support collar of the needle is at the centre of a bell-shaped chamber having an ogival profile whose lateral external surface perfectly connects and fits to the cylindrical surface of the body of the syringe.

At the base of this bell-shaped chamber there is an annular groove having a semicircular cross-section, similar to the pair of grooves close to the two ends of the syringe, so that when the cap of the syringe is removed, the elastic teeth positioned at the opening can wedge into place - after having slipped over the groove close to the tip of the syringe - in the groove on the bell-shaped chamber which incorporates the support collar of the needle.

By holding and closing the cap at the opening it hooks securely to the bell-shaped chamber thanks to the above teeth, so that when the cap is removed completely from the syringe, the needle-holder collar is also removed from the press fit opening at the top of the syringe.

At this point the needle can be thrown away with no danger whatsoever since it is covered by the above cap in which it is fixed and enclosed.

According to another embodiment of the invention, the stop of the cap on the syringe and/or on the bell-shaped chamber incorporating the support collar of the needle can be obtained with a nut which is screwed outside the opening of the cap and which bends the elastic tabs on the opening of the cap, inwards, until the cap stops.

For major clarity the description of the invention continues with reference to the drawings which are intended for illustrative purposes and not in a limiting sense, in which:

- fig. 1 shows the syringe according to the invention, represented with a half view and a half cross-section, with the protection cap pulled out in full to cover the needle;
- fig. 2 shows the syringe according to the invention, represented with a half view and a half cross-section with the protection cap removed from the body of the syringe but still hooked to the support collar of the needle.
- fig. 3 shows the syringe according to the invention, represented in a half view and in a half cross-section,

with the support collar of the needle removed from the syringe and hooked inside the protection cap.

- fig. 4 shows the syringe according to the invention in a further construction embodiment having a fixing nut to stop the sliding cap.

With reference to figures 1, 2 and 3, the syringe (1) has two external annular grooves (1a) having a semi-circular cross-section, one close to its tip and the other close to its opening.

Outside the syringe (1) there is a cylindrical sliding cap (2) having an opening with a number of longitudinal slits which separate an annular series of elastic tabs (2a), each of which terminates with an internal raised edge (2b) having a semi-circular cross-section, which press fits, at the end of the backward or forward run of the cap (2) onto the syringe (1) into the above annular grooves (1a) which therefore act as end housings and end of run stops for the cap (2).

The support collar (3) of the needle (3a) is made in a bell-shaped chamber (4) having an ogival shape, whose external surface fits perfectly with the cylindrical surface of the body of the syringe (1).

At the base of the bell-shaped chamber (4) there is an external annular groove (4a) having a semi-circular cross-section identical to the grooves of the syringe (1).

As illustrated in fig. 3, by completely removing the cap (2) from the syringe (1), during the forward run of the cap, the internal edge (2b) of the elastic tabs (2a) couples with the annular groove (4a), with consequent engagement of the bell-shaped chamber (4) which is wedged in the opening of the cap (2).

The collar (3) can therefore be removed from the opening of the syringe (1) with the needle (3a) covered and enclosed inside the cap (2); in holding the cap by its opening, the connection with the bell-shaped chamber (4), is strengthened and stabilized, so that the same is fastened to the cap (2) and is removed from the syringe (1) together with the cap.

With reference to fig. 4, it should be noted that in a further construction embodiment of the invention, the cap (2) is fitted with a nut (5) which is screwed outside its opening, thereby creating a gradual hold of the elastic tabs (2c), whose external profile is suitable slanted for this purpose in order to interfere with the opening of the nut (5).

In this version, the elastic tabs do not have any raised internal edge, and the syringe (1) and the bell-shaped chamber (4b) does not have annular grooves for hooking the elastic tabs, since the cap (2) is not stopped by the male and female coupling of adjacent elements, but simply by adherence on the external surface of the syringe (1) or of the bell-shaped chamber (4b) of the tabs (2c) which are gradually fixed by the nut (5) as it is screwed.

The cap (2) has a centre hole at its tip which allows the needle (3a) to move out when the cap is pushed

back completely.

In particular, this hole is closed by a spongy membrane (6) soaked with disinfecting and sterilizing substances which hermetically seals the internal compartment of the cap until such time as the syringe is used, but which can be easily crossed by the needle (3a) when it is pushed out, as soon as the cap (2) is pulled backwards.

To replace the spongy membrane (6), a small removable cap could be used which hermetically closes the hole on the tip of the sliding cap.

#### Claims

1. A single-use syringe having a protection cap (2) for the needle (3a) sliding longitudinally outside the syringe (1); the cap (2) and the syringe (1) being connected with a reciprocal coupling mechanism, whose interference creates the forward and backward end of run stop points of the cap (2) along the syringe (1) characterised in that a support collar (3) of the needle (3a) is housed inside a removable bell-shaped chamber (4) having an ogival shape, whose external surface connects precisely with the cylindrical shape of the body of the syringe (1) where the cap (2) is provided with a suitable connection mechanism inside the opening of the sliding cap for coupling the bell-shaped chamber (4).
2. A single-use syringe according to claim 1 characterised in that the base of the bell-shaped chamber (4) is provided with an external annular groove (4a) having a semi-circular cross-section identical to two annular grooves (1a) close to the tip and the opening of the syringe (1); the sliding cap (2) being provided with a series of elastic tabs (2a) at its mouth which has a raised internal edge (2b) coupling with the annular grooves (1a) of the syringe (1) and with the annular grooves (4a) of the bell-shaped chamber.
3. A single-use syringe having a protection cap (2) for the needle (3a) sliding longitudinally outside the syringe (1); the cap (2) and the syringe (1) being connected with a reciprocal coupling mechanism, whose interference creates the forward and backward end of run stop points of the cap (2) along the syringe (1) characterised in that a support collar (3) of the needle (3a) is housed inside a removable bell-shaped chamber (4) having an ogival shape, whose external surface connects precisely with the cylindrical shape of the body of the syringe (1) where:
  - the bell-shaped chamber (4) has a section of the base with cylindrical profile;
  - the cap (2) is provided, at its mouth, with a series of elastic tabs (2c) having a slanted

external profile with which a nut (5) screwed externally to the mouth of the cap (2), interferes.

4. A single-use syringe according to claims 1 and 3, characterised in that the cap (2) at its tip is provided with a hole sealed by a spongy membrane (6) soaked in sterilising or disinfecting substances.
5. A single-use syringe according to claims 1 and 3, characterised in that the cap (2) at its tip has a hole sealed by a small removable cap.

#### Patentansprüche

1. Einwegspritze bestehend aus einer in Längsrichtung der Spritze (1) außen verschiebbaren Kappe (2) zum Schutz der Nadel (3a); wobei die Kappe (2) und die Spritze (1) durch einen gegenseitigen Einrastmechanismus verbunden sind, dessen Zusammenspiel entlang der Spritze (1) die vorderen und hinteren Anschlagpunkte der Kappe (2) bildet, dadurch gekennzeichnet, daß ein Haltekragen (3) der Nadel (3a) sich in einer spitzbogenförmigen Glocke (4) befindet, deren Außenfläche perfekt in die zylindrische Form des Spritzenkörpers paßt, wobei die Kappe (2) an der Innenseite ihrer Öffnung einen geeigneten Mechanismus zum Aufstecken der Glocke (4) besitzt.
2. Einwegspritze, gemäß Patentanspruch 1) dadurch gekennzeichnet, daß sich an der Basis der Glocke (4) eine äußere, ringförmige, einen halbkreisförmigen Querschnitt aufweisende Rille (4a) befindet, die zwei ringförmigen, sich in Nähe der Spitze und der Öffnung der Spritze (1) befindenden ringförmigen Rillen (1a) identisch ist; wobei die verschiebbare Kappe (2) an ihrer Öffnung eine Serie von elastischen Zungen (2a) aufweist, welche einen erhöhten Innenrand (2b) besitzen, der sich exakt sowohl an die besagten ringförmigen Rillen (1a) der Spritze (1) als auch an die ringförmige Rille (4a) der Glocke (4) anpaßt.
3. Einwegspritze, bestehend aus einer in Längsrichtung der Spritze (1) außen verschiebbaren Kappe (2) zum Schutz der Nadel (3a); wobei Kappe (2) und Spritze (1) durch einen gegenseitigen Einrastmechanismus verbunden sind, dessen Zusammenspiel entlang der Spritze (1) die vorderen und hinteren Anschlagpunkte der Kappe (2) bildet, dadurch gekennzeichnet, daß ein Haltekragen (3) der Nadel (3a) sich in einer spitzbogenförmigen Glocke (4) befindet, deren Außenfläche perfekt in die zylindrische Form des Spritzenkörpers (1) paßt, wobei
  - die Glocke (4) einen Basisquerschnitt von

zylindrischem Profil aufweist;

- die Kappe (2) an ihrer Öffnung eine Serie von elastischen Zungen (2c) besitzt, die ein geneigtes Außenprofil aufweisen, auf die eine Mutter (5) wirkt, die außen an der Öffnung der Kappe (2) angeschraubt ist.

4. Einwegspritze, gemäß Patentanspruch 1) und 3) dadurch gekennzeichnet, daß die Kappe (2) an ihrer Spitze ein Loch aufweist, welches durch eine mit desinfizierenden und sterilisierenden Substanzen getränkten Schaummembran (6) verschlossen ist.
5. Einwegspritze, gemäß Patentanspruch 1) und 3) dadurch gekennzeichnet, daß die Kappe (2) an ihrer Spitze ein Loch aufweist, das durch eine kleine abnehmbare Kappe verschlossen ist.

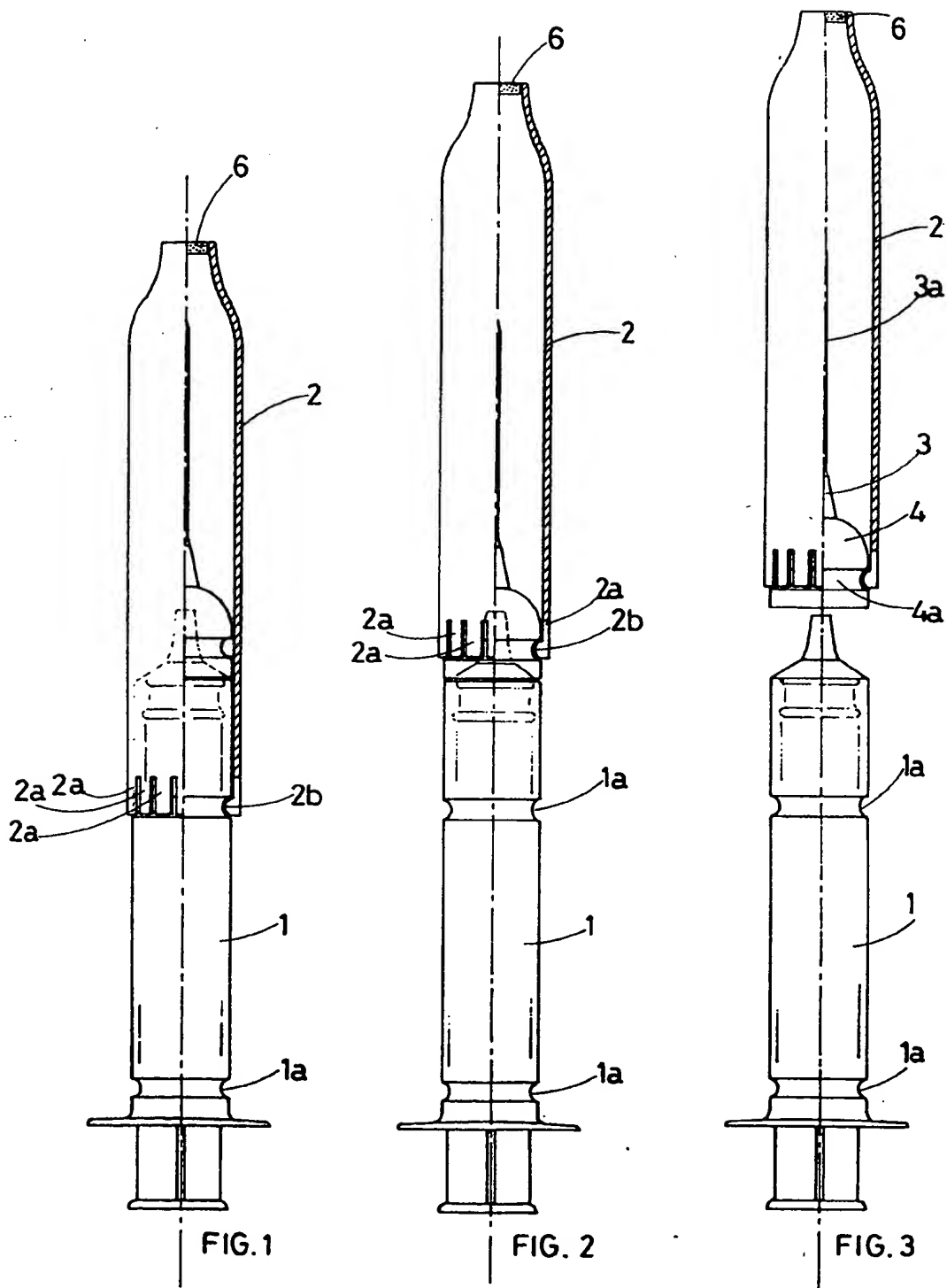
#### Revendications

1. Seringue à jeter après usage comprenant un capuchon coulissant de protection pour l'aiguille, du type ayant le capuchon (2) de protection de l'aiguille (3a) coulissant longitudinalement à l'externe de la seringue (1); le capuchon (2) et la seringue (1) étant reliés par un mécanisme de couplage réciproque, dont l'interférence crée les points d'arrêt antérieurs et postérieurs du capuchon (2) le long de la seringue (1), caractérisée en ce que le collier de support (3) de l'aiguille (3a) est incorporé dans une cloche (4) ayant forme ogivale et dont la surface externe se raccorde parfaitement avec celle cylindrique du corps de la seringue (1) et où le capuchon (2) présente, en correspondance de son embouchure, un mécanisme adapté à l'accrochage de la cloche (4).
2. Seringue à jeter après usage selon la revendication 1), caractérisée en ce que une gorge annulaire externe (4a) a été réalisée à la base de la cloche (4), gorge dont la section semi-circulaire est identique aux deux gorges annulaires (1a) réalisées en proximité de la pointe et de l'embouchure de la seringue (1); étant prévu que le capuchon coulissant (2) soit doté, en correspondance de son embouchure, d'une série de languettes élastiques (2a) qui présentent un bord interne en relief (2b) apte à se conjuguer exactement tant avec les précitées gorges annulaires (1a) de la seringue (1) qu'avec la gorge annulaire (4a) de la cloche (4).
3. Seringue à jeter après usage comprenant un capuchon coulissant de protection pour l'aiguille, du type ayant un capuchon (2) de protection de l'aiguille (3a) coulissant longitudinalement à l'externe de la seringue (1); le capuchon (2) et la seringue (1) étant reliés par un mécanisme de couplage réciproque, dont l'interférence crée les points d'arrêt anté-

rieurs et postérieurs du capuchon (2) le long de la seringue (1), caractérisée en ce que le collier de support (3) de l'aiguille (3a) est incorporé dans une cloche (4) ayant forme ogivale et dont la surface externe se raccorde parfaitement avec celle cylindrique du corps de la seringue (1) et où:

- la cloche (4) présente un segment de base ayant profil cylindrique;
- le capuchon (2) présente, en correspondance de son ouverture, une série de languettes élastiques (2c), ayant profil externe incliné, avec lesquelles interfère un écrou (5) vissé à l'externe de l'embouchure du capuchon (2).

4. Seringue à jeter après usage, incorporant un capuchon coulissant pour l'aiguille selon les revendications 1) et 3), caractérisée en ce que le capuchon (2), en correspondance de sa pointe, présente un perçage scellé par une membrane spongieuse (6) imprégnée de substances désinfectantes et stérilisantes.
5. Seringue à jeter après usage, incorporant un capuchon coulissant pour l'aiguille selon les revendications 1) et 3), caractérisée en ce que le capuchon (2), en correspondance de sa pointe, présente un perçage scellé par un petit capuchon amovible.



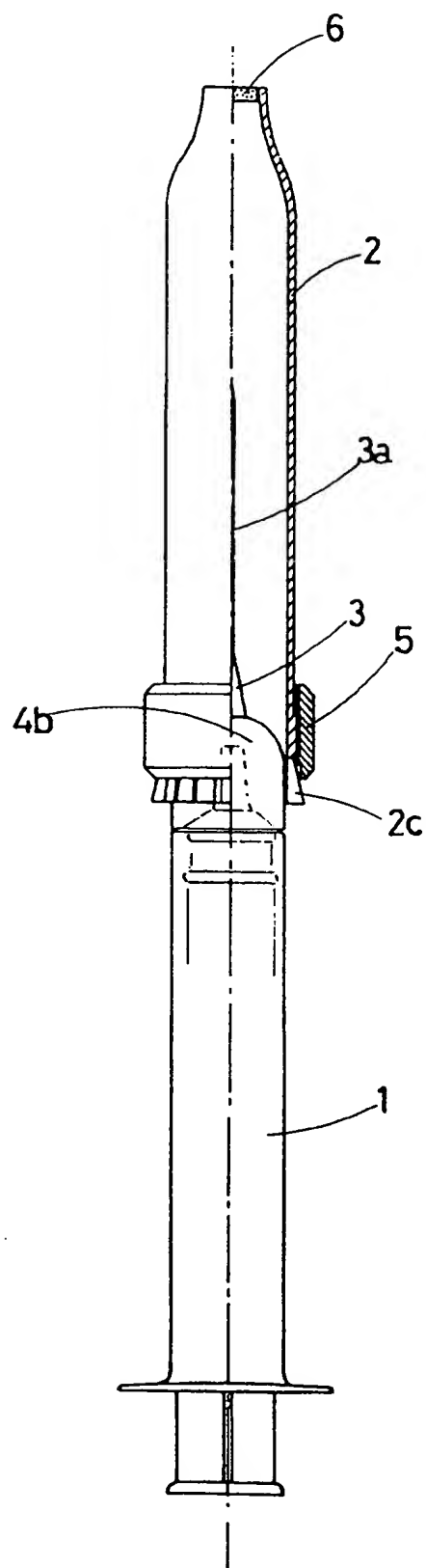


FIG. 4